John D. Spence

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Education

Ph. D., Chemistry. University of California, Davis. September 1997.
Design and Synthesis of Spirocyclic Supported Enediynes as Calicheamicinone Analogs: Steric Inhibition as a Means to Control Bergman Cycloaromatization.
B. S., Chemistry. St. Mary's College of California. May 1992.

Teaching Experience

Associate Professor, CSU Sacramento, Fall 2009 – Present.
Assistant Professor, CSU Sacramento, Fall 2004 – Spring 2009.
Assistant Professor, Trinity University, Fall 1999 – Spring 2004.
Visiting Assistant Professor, Illinois State University, Fall 1997 – Spring 1999.
Lecturer, UC Davis, Spring 1997; Saint Mary's College, Spring 1997.

Courses Taught

Organic Chemistry I	Organic Chemistry Lab I	Combinatorial Chemistry
Organic Chemistry II	Organic Chemistry Lab II	Supramolecular Chemistry
Organic Stereochemistry	Advanced Organic Lab	Physical Organic Chemistry
Organic Synthesis	Inorganic Chemistry Lab	Research in Chemistry

Honors and Awards

Outstanding Research Award, Faculty Senate, CSU Sacramento, 2012.
T.H. Cheng Outstanding Teaching Award, Department of Chemistry, CSUS, 2007 and 2006.
Montalbano Distinguished Professor of the Year, Trinity Association of Student Representatives, 2002.
Professor of the Month, Trinity University Association of Student Representatives, October 2001.
Dreyfus Fellow, Illinois State University, August 1997 - August 1999.
Teaching Award for Outstanding Graduate Student, UC Davis, May 1997.

Campus and Professional Activities

CSUS: Russell-Forkey Research Award Committee (2012-current); SEE Advisory Committee (2012-current); Retention, Tenure, Promotion Committee (2011-current); Department of Chemistry Student Recruitment Committee (2005-current); Graduate Committee (2005-current); Undergraduate Research Task Force (2009-2010), NSM Academic Council (2004-2006); Organic Hiring Committee (2004, 2005, 2007); Technical Staff Hiring Committee (2005, 2006, 2007).

Peer Reviewer: Journal of the American Chemical Society, Tetrahedron Letters, European Journal of Organic Chemistry, Organic Reactions Catalysis Society, ACS-Petroleum Research Fund, National Science Foundation, Research Corporation, The Chemical Educator.

Memberships

American Chemical Society (member since 1994)

Grants Received

- California State University Program in Education and Research in Biotechnology (CSUPERB), "Shedding Light on Quinoxalenediyne Reactivity." $15,000 (2013–2014)
- CSUS Research and Creative Activity Award, 3 units release time. (2011–2012)
- National Science Foundation, Major Research Instrumentation (NSF-MRI), "Acquisition of a 500 MHz NMR Spectrometer for Research at CSU Sacramento." $655,000 (2009–2012)
- CSUS Pedagogy Enhancement Award, 3 units release time. (2009–2010)
- Petroleum Research Fund, American Chemical Society, "Synthesis, Thermal, and Photoreactivity of Highly Conjugated Arenediynes." $65,000 (2008–2012)
- CSUS Research and Creative Activity Award, 6 units release time. (2008–2009)
- CSUS Research and Creative Activity Award, $5,500 plus 3 units release time. (2007–2008)
- CSUS Research and Creative Activity Award, $2,500 plus 6 units release time. (2006–2007)
- California State University Program in Education and Research in Biotechnology (CSUPERB), "Design and Synthesis of Light-Activated Enediyne Pro-Drugs." $10,000 (2005–2006)
- GenCorp Foundation, "Funding for Synthetic Organic Chemistry Projects at CSUS." $40,000 (Co-PI with C. Kellen-Yuen and D. Forkey), (2004–2007)
- Petroleum Research Fund, American Chemical Society, "Azacalix[4]arenes: Nitrogen-Bridged Analogs of *p-tert*-Butylcalix[4]arene." $35,000 (2002–2005)
- Merck Company Foundation AAAS, "Collaborative Research In Chemistry and Biology." $60,000 (one of three Co-PI's at Trinity University), (2002–2005)
- Research Corporation, "Design of Enediyne Pro-Drugs Incorporating Porphyrin Macrocycles as Delivery Agents and Triggering Mechanisms." $35,000 (2001–2003)
- Dreyfus Foundation, "New Faculty Start-Up Award." $10,000 (2000–2002)

Publications Undergraduate co-authors underlined

22. C. J. Kellen-Yuen, J. D. Spence, B. F. Gherman. The Effect of Solvent on Reaction Products: A Study of Isatin Condensation Reactions. To be submitted to *The Chemical Educator*, **2014**.

21. J. D. Spence, M. L. Lackie, N. A. Clayton, S. A. Toscano, M. A. Farmer, E. Popova, M. M. Olmstead. Syntheses, Structure, and Reactivity of Acyclic Enetriyne and Enetetrayne Derivatives. *Tetrahedron Letters*, **2014**, *55*, 1569-1572.

20. J. D. Spence, A. C. Rios, M. A. Frost, C. M. McCutcheon, C. D. Cox, S. Chavez, R. Fernandez, B. F. Gherman. Syntheses, Thermal Reactivities and Computational Studies of Aryl-Fused Quinoxalenediynes: Effect of Extended Benzannelation on Bergman Cyclization Energetics. *Journal of Organic Chemistry*, **2012**, 77, 10329-10339.

19. N. V. Korovina, M. L. Chang, T. T. Nguyen, R. Fernandez, H. J. Walker, M. M. Olmstead, B. F. Gherman and J. D. Spence. Syntheses and Reactivity of Naphthalenyl-Substituted Arenediynes. *Organic Letters*, **2011**, *13*, 3660-3663.

18. K. V. Lawson, A. C. Barton and J. D. Spence. Synthesis of Diazacalix[8]arene and Triazacalix[12]arene Methyl Ethers via Intramolecular Aryl Amination. *Organic Letters*, **2009**, *11*, 895-898.

17. A. R. Urbach, C. J. Pursell and J. D. Spence. Supramolecular Chemistry: A Senior Capstone Course. *J. Chem. Ed.*, **2007**, *84*, 1785-1787.

16. J. D. Spence, A. E. Hargrove, H. L. Crampton and D. W. Thomas. Porphyrenediynes: Synthesis and Cyclization of *meso*-Enediynylporphyrins. *Tetrahedron Letters*, **2007**, *48*, 725-728.

15. N. S. Mills, J. D. Spence and M. M. Bushey. Capillary Electrophoresis Analysis of Substituted Benzoic Acids. *J. Chem. Ed*., **2005**, *82*, 1226-1228.

14. J. D. Spence, E. D. Cline, D. M. LLagostera and P. S. O'Toole. Synthesis and Bergman Cyclization of a *beta*-Extended Porphyrenediyne. *Chem. Commun.*, **2004**, 180-181.

13. T. D. Lash, M. A. Muckey, M. J. Hayes, D. Liu, J. D. Spence and G. M. Ferrence. Regioselective Oxidation of Benzocarbaporphyrins with Ferric Chloride: A Facile Synthesis of Bridged [18]Annulene Ketals with Strong Absorptions in the Far Red and an Unexpected Halogenation Reaction at the Interior Carbon Atom. *J. Org. Chem.* **2003**, *68*, 8558-8570.

12. J. D. Spence, A. E. Raymond and D. E. Norton. Condensations of N-Arylhydroxylamines for the Preparation of 5,5'-di-tert-butyl-2,2'-dihydroxydiphenylamine. *Tetrahedron Letters*, **2003**, *44*, 849-851.

11. T. D. Lash, M. J. Hayes, J. D. Spence, M. A. Muckey, G. M. Ferrence and L. F. Szczepura. Conjugated Macrocycles Related to the Porphyrins. 21. Synthesis, Spectroscopy, Electrochemistry and Structural Characterization of Carbaporphyrins. *J. Org. Chem*., **2002**, *67*, 4860-4874.

10. T. D. Lash, M. L. Thompson, T. M. Werner and J. D. Spence. Synthesis of Novel Pyrrolic Compounds from Nitroarenes and Isocyanoacetates Using a Phosphazene Superbase. *Synlett*, **2000** (*2*), 213-216.

9. J. D. Spence and T. D. Lash. Porphyrins with Exocyclic Rings. Part 14. Synthesis of Tetraacenaphtho-porphyrins, a New Family of Highly Conjugated Porphyrins with Record Breaking Long Wavelength Electronic Absorptions. *J. Org. Chem.*, **2000**, *65*,1530-1539.

8. D. K. Moss, J. D. Spence and M. H. Nantz. Effects of Propargylic Substitution and Annelation on the Cycloaromatization of a Bicyclo[7.3.1] Enediyne. *J. Org. Chem*., **1999**, *64*, 4339-4343.

7. T. D. Lash, J. L. Romanic, M. J. Hayes and J. D. Spence. Towards Hydrocarbon Analogues of the Porphyrins: Synthesis and Spectroscopic Characterization of the First Dicarbaporphyrin. *J. Chem. Soc., Chem. Commun.*, **1999**, 819-820.

6. M. J. Hayes, J. D. Spence, and T. D. Lash. Facile Oxidation of a Carbaporphyrin at the Internal Carbon Atom: Synthesis of Novel Benzo[18]annulene Ketals. *J. Chem. Soc., Chem. Commun*., **1998**, 2409-2410.

5. T. D. Lash, P. Chandrasekar, A. T. Osuma, S. T. Chaney, and J. D. Spence. Porphyrins with Exocyclic Rings. Part 13. Synthesis and Spectroscopic Characterization of Highly Modified Porphyrin Chromophores with Fused Acenaphthylene or Benzothiadiazole Rings. *J. Org. Chem*., **1998**, *63*, 8455-8469.

4. M. H. Nantz, D. K. Moss, J. D. Spence, and M. M. Olmstead. Actuating Cycloaromatization of a Bicyclo[7.3.1] Enediyne by Annelation, an Example of Inverse Dependence on Bridge Hybridization. *Angew. Chem. Int. Ed. Engl.*, **1998**, *37*, 470-473.

3. R. P. Balasubramaniam, D. K. Moss, J. K. Wyatt, J. D. Spence, A. Gee, and M. H. Nantz. Methylation-Ring Opening of 3,3-Disubstituted 2,3-Epoxy Alcohols. Synthesis of Chiral Quaternary Fragments for Assembly of Briaran Diterpenes. *Tetrahedron*, **1997**, *53*, 7429-7444.

2. J. D. Spence, J. K. Wyatt, D. M. Bender, D. K. Moss and M. H. Nantz. Stereogenic Propargylic Centers Via Base-Mediated Terminal Allene Isomerization. *J. Org. Chem.*, **1996**, *61*, 4014-4021.

1. J. D. Spence, L. E. Lowrie and M. H. Nantz. Cyclobutene Formation Accompanying an Intramolecular Lewis Acid-Promoted Spirocyclization of a Propargylic Silane. *Tetrahedron Letters*, **1995**, *36*, 5499-5502.

Presentations

J. D. Spence. "Synthesis and Bergman Cyclization of Highly Conjugated Arenediynes." Presented at the 231st National Meeting of the American Chemical Society, Atlanta, GA, March 2006. Paper 17.

J. D. Spence. "Rational Drug Design from Organic Chemistry: Synthesis and Cyclization of Porphyrin-Enediyne Hybrids." St. Mary's College, Moraga, CA, 2005.

J. D. Spence. "Porphyrenediynes: Synthesis and Bergman Cyclization of beta-Extended and meso-Tethered Porphyrinic Enediynes." Presented at the 227th National Meeting of the American Chemical Society, Anaheim, CA, March 2004.

J. D. Spence. "Porphyrenediynes: Synthesis and Bergman Cyclization of Porphyrin-Enediyne Hybrids." Presented at the 58th Southwest Regional Meeting of the American Chemical Society, Austin, TX, November 2002. Paper 361.

J. D. Spence. "Fragment Approach Towards the Synthesis of Azacalix[4]arenes via Condensations of N-Arylhydroxylamines." Presented at the 58th Southwest Regional Meeting of the American Chemical Society, Austin, TX, November 2002. Paper 205.

J. D. Spence. "Synthesis and Condensations of N-Arylhydroxylamines for the Preparation of Nitrogen Bridged Calixarenes and Porphyrins." Presented at the 57th Southwest Regional Meeting of the American Chemical Society, San Antonio, Texas, October 2001. Paper 55.

J. D. Spence. "Nitrogen Bridged Macrocycles Related to Calixarenes." Presented at the 37th National Organic Symposium, Bozeman, Montana, June 2001. Paper 201.

J. D. Spence and T. D. Lash. "Carbaporphyrins: Continued Development in the Chemistry of Cyclopentadienyl Analogues of Porphyrins." Presented at the 1st International Conference on Porphyrins and Phthalocyanines, Dijon, France, June 2000. Paper 572.

J. D. Spence. "Design and Synthetic Approaches Towards Porphyrin Analogues as Improved Anticancer Agents." Texas Lutheran University, Seguin, Texas. October 27, 2000.

J. D. Spence, M. J. Hayes and T. D. Lash. "Synthesis of Carbaporphyrins and Functionalization of the Interior Carbon Atom." Presented at the 215th National Meeting of the American Chemical Society, Boston, MA, August 1998. Paper 728.

J. D. Spence and T. D. Lash. "Synthesis of Acenaphthoporphyrins: Extending the Conjugation of the Porphyrin Core to Produce Red-Shifted Spectra." Presented at the 12th International Conference on Organic Synthesis, Venice, Italy, July 1998. Paper 063.

J. D. Spence and T. D. Lash. "Synthesis of Tetraphenyltetraacenaphthoporphyrins." Presented at the 31st Great Lakes Regional Meeting of the American Chemical Society, Milwaukee, WI, June 1998. Paper 189.

J. D. Spence, D. K. Moss, and M. H. Nantz. "Synthesis of a Bicyclo[7.3.1] Enediyne Equipped with Functionality for Triggering Cycloaromatization." Presented at the 35th National Organic Chemistry Symposium, San Antonio, TX, June 1997. Paper 138.

D. K. Moss, J. D. Spence, and M. H. Nantz. "Synthesis and Triggering of a Spirocyclic Calicheamicinone Analog." Presented at the 213th National Meeting of the American Chemical Society, San Francisco, CA, April 1997. Paper 98.

J. D. Spence and M. H. Nantz. "Progress Toward the Synthesis of a Spirocyclic Model of Calicheamicinone." Presented at the 11th International Conference on Organic Synthesis, Amsterdam, The Netherlands, July 1996. Paper 387.

J. D. Spence and M. H. Nantz. "Synthesis of Spirocyclic Supported Enediynes as Calicheamicin Analogs." Presented at the 8th meeting on Recent Advances in Organometallic Chemistry in Organic Synthesis, Davis, CA, August 1995. Paper Inv-25.

J. D. Spence and M. H. Nantz. "Cyclobutene Formation Via Intramolecular Lewis Acid Promoted Conjugate Addition of a Propargyl Silane." Presented at the 30th Western Regional Meeting of the American Chemical Society, Sacramento, CA, October 1994. Paper 231.

J. D. Spence and S. J. Bachofer. "Oxidation Kinetics of an Organic Sulfide Under Micellar Catalysis." Presented at the Undergraduate Research Symposium, sponsored by the California Section of the American Chemical Society, Moraga, CA, April 1992.

Research Student Presentations

Adam B. Ung, Benjamin F. Gherman and John D. Spence. "Computational Study of the Cyclization Reactions of Phenyl-Substituted Enediynes with Benzannelated and Quinoxaline-Based Supporting Groups." Presented at the 26th Annual Northern California ACS Undergraduate Research Symposium, University of San Francisco, May 2014.

Kiara Velazquez, Elizabeth Grace Tuazon and John D. Spence. "Steric and Electronic Effects on Photochemical Bergman Cyclization of Acyclic Enediynes." Presented at the 26th Annual Northern California ACS Undergraduate Research Symposium, University of San Francisco, May 2014.

Anthony W. Vuong and John D. Spence. "Examining Aromaticity Gain in the Bergman Cyclization of Quinoxalenediynes." Presented at the 26th Annual Northern California ACS Undergraduate Research Symposium, University of San Francisco, May 2014.

Phillip J. Marzouk, Benjamin F. Gherman and John D. Spence. "Time Dependent Density Functional Theory Study of the Bergman Photocyclization Reactivity of Enediynes." To be presented at the 26th California State University Biotechnology Symposium, Santa Clara, CA, January 2014.

Cui Q. Li, Benjamin F. Gherman and John D. Spence. "Computational and Experimental Study of the Thermal Cyclization of Enediynones and Dienyynones." To be presented at the 26th California State University Biotechnology Symposium, Santa Clara, CA, January 2014.

Kiara Velazquez and John D. Spence. "Enhanced photo-Bergman cyclization of an electron rich mono-substituted arenediyne." Presented at the CSUS NSM Undergraduate Research Reception, October, 2013.

Sergio A. Toscano and John D. Spence. "Design and synthetic approach towards novel quinoxalenediynes." Presented at the CSUS NSM Undergraduate Research Reception, October, 2013.

Phillip J. Marzouk, Benjamin F. Gherman and John D. Spence. "Photoexcitation of Enediyne Compounds and Implications for their Bergman Cyclization Reactivity." Presented at the 44th Western Regional American Chemical Society Meeting, Santa Clara, CA, October 2013. Paper 51.

Cui Q. Li, Benjamin F. Gherman and John D. Spence. "Computational and Experimental Study of the Thermal Cyclization of Enediynones and Dieneynones." Presented at the 44th Western Regional American Chemical Society Meeting, Santa Clara, CA, October 2013. Paper 50.

Sergio A. Toscano and John D. Spence. "Design and synthetic approach towards novel quinoxalenediynes." Presented at the 44th Western Regional American Chemical Society Meeting, Santa Clara, CA, October 2013. Paper 330.

Kiara Velazquez and John D. Spence. "Enhanced photo-Bergman cyclization of an electron rich mono-substituted arenediyne." Presented at the 44th Western Regional American Chemical Society Meeting, Santa Clara, CA, October 2013. Paper 329.

Esfir Popova and John D. Spence. "Electronic Properties and Photo-Reactivity of Highly Conjugated Enediynes." Presented at the 25th Annual Northern California ACS Undergraduate Research Symposium, Santa Clara University, May 2013.

Mofeid Y. Hussain and John D. Spence. "Enhanced Photo-Bergman Cyclization of a Methoxy Substituted Arenediyne." Presented at the 25th Annual Northern California ACS Undergraduate Research Symposium, Santa Clara University, May 2013.

Kiara Velazquez and John D. Spence. "Synthesis and Reactivity of Electron Rich Enediynes." Presented at the 25th Annual Northern California ACS Undergraduate Research Symposium, Santa Clara University, May 2013.

Brianna White and John D. Spence. "Synthesis of Imidazol-5-yl Substituted Arenediyne to Examine Photo-Bergman Cyclization." Presented at the 25th Annual Northern California ACS Undergraduate Research Symposium, Santa Clara University, May 2013.

Kellie Minnick, Ramiro P. Fernandez, Benjamin F. Gherman and John D. Spence. “Computational Analysis of Cyclization Reactions of Monosubstituted Enediynes and Comparison to Disubstituted Enediynes.” Presented at the 25th California State University Biotechnology Symposium, Anaheim, CA, January 2013.

Phillip J. Marzouk, Benjamin F. Gherman and John D. Spence. “Photoactivation of Enediyne Compounds and Implications for Their Bergman Cyclization Reactivity.” Presented at the 25th California State University Biotechnology Symposium, Anaheim, CA, January 2013.

Kiara Velazquez and John D. Spence. "Synthesis and Reactivity of Electron Rich Arenediynes." Presented at the CSUS NSM Undergraduate Research Reception, October, 2012.

Kellie Minnick, Ramiro Fernandez, Benjamin F. Gherman and John D. Spence. "Computational Study of Cyclization Reactions of Monosubstituted Enediynes and Comparison to Disubstituted Enediynes." Presented at the CSUS NSM Undergraduate Research Reception, October, 2012.

Michelle A. Farmer and John D. Spence. "Thermal Reactivity of Methoxynaphthyl-Substituted Enediynes." Presented at the 24th Annual Northern California ACS Undergraduate Research Symposium, Mills College, Oakland, CA, May 2012.

Svetlana N. Guevara and John D. Spence. "Synthesis and [2+2] Photodimerization of Highly Conjugated Enediynes." Presented at the 24th Annual Northern California ACS Undergraduate Research Symposium, Mills College, Oakland, CA, May 2012.

Lynn Q. Nguyen and John D. Spence. "Exploring the Syntheses and Photo-Bergman Reactions of Highly Conjugated Mono-Substituted Arenediynes." Presented at the 24th Annual Northern California ACS Undergraduate Research Symposium, Mills College, Oakland, CA, May 2012.

Sergio A. Toscano and John D. Spence. "Synthesis and Photo-Bergman Cyclization of Symmetrical 6-Methoxynaphthalen-2-yl Arenediyne." Presented at the 24th Annual Northern California ACS Undergraduate Research Symposium, Mills College, Oakland, CA, May 2012.

Mustafa Safi, Ramiro Fernandez, Benjamin F. Gherman and John D. Spence. "Electronic Effects on the Cyclization Reactions of Enediynes Explored Through Modifications to the Enediyne Supporting Group." Presented at the 24th Annual Northern California ACS Undergraduate Research Symposium, Mills College, Oakland, CA, May 2012.

Svetlana N. Guevara, Nicole M. Horton and John D. Spence. "Syntheses, Electronic Properties and Photochemical Reactivity of Symmetrical Arylethynyl Arenediynes." Presented at the 243rd National Meeting of the American Chemical Society, San Diego, CA, March 2012. Paper CHED 1015.

Lynn Q. Nguyen, Sergio A. Toscano and John D. Spence. "Syntheses and Photo-Bergman Cyclization of Methoxynaphthalen-2-yl Arenediyne Derivatives." Presented at the 243rd National Meeting of the American Chemical Society, San Diego, CA, March 2012. Paper CHED 1016.

Svetlana N. Cherniogloglo, Lynn Q. Nguyen and John D. Spence. "Synthesis and Photoreactivity of Electron Rich Arenediynes." Presented at the CSUS NSM Undergraduate Research Reception, October, 2011.

Nicole M. Horton and John D. Spence. "Detecting Excimer Emission in Aromatic Enediynes." Presented at the CSUS NSM Undergraduate Research Reception, October, 2011.

Sergio A. Toscano and John D. Spence. "Improved Syntheses of Symmetrical Arenediynes." Presented at the CSUS NSM Undergraduate Research Reception, October, 2011.

Ramiro Fernandez, Nadia Korovina, Benjamin F. Gherman and John D. Spence. "Computational Study of the Cyclization Reactions of Quinoxaline-Based Enediynes." Presented at the 23rd Annual Northern California ACS Undergraduate Research Symposium, San Jose State University, San Jose, CA, May 2011.

Nadezhda V. Korovina, Benjamin F. Gherman and John D. Spence. "Computational Study of the Cyclization Reactions of Naphthyl-Substituted Enediynes." Presented at the 239th National Meeting of the American Chemical Society, San Francisco, CA, March 2010. Paper CHED 958. Also Presented at the 22nd Annual Northern California ACS Undergraduate Research Symposium, CSU Sacramento, Sacramento, CA, May 2010.

Trang T. Nguyen, Michael L. Chang and John D. Spence. "Syntheses and Reactivity of Methoxynaphthyl-Substituted Enediynes." Presented at the 239th National Meeting of the American Chemical Society, San Francisco, CA, March 2010. Paper CHED 1102. Also Presented at the 22nd Annual Northern California ACS Undergraduate Research Symposium, CSU Sacramento, Sacramento, CA, May 2010.

Nicola A. Clayton and John D. Spence. "Will Butadiynyl Arenediyne Derivatives Undergo Bergman Cyclization?." Presented at the 239th National Meeting of the American Chemical Society, San

Francisco, CA, March 2010. Paper CHED 1105. Also Presented at the 22nd Annual Northern California ACS Undergraduate Research Symposium, CSU Sacramento, Sacramento, CA, May 2010.

Nicholas P. Genovia and John D. Spence. "Enhanced Photo-Bergman Cyclization of 1-Ethynyl-2-(phenylethynyl)benzene." Presented at the 239th National Meeting of the American Chemical Society, San Francisco, CA, March 2010. Paper CHED 1109. Also Presented at the 22nd Annual Northern California ACS Undergraduate Research Symposium, CSU Sacramento, Sacramento, CA, May 2010.

Michael L. Chang, Calvin W. Ruger and John D. Spence. "Highly Conjugated Arenediynes: Phenanthrenyl-Substituted Enediynes." Presented at the 239th National Meeting of the American Chemical Society, San Francisco, CA, March 2010. Paper CHED 1111. Also Presented at the 22nd Annual Northern California ACS Undergraduate Research Symposium, CSU Sacramento, Sacramento, CA, May 2010.

Joshua D. Flynn, Christopher J. Stains and John D. Spence. "Aryl-Amination Strategies to Prepare Aza-Bridged Calixarenes." Presented at the 239th National Meeting of the American Chemical Society, San Francisco, CA, March 2010. Paper CHED 1116. Also Presented at the 22nd Annual Northern California ACS Undergraduate Research Symposium, CSU Sacramento, Sacramento, CA, May 2010.

Nadia Korovina, Benjamin F. Gherman and John D. Spence. "Computational Study of the Cyclization Reactions of Naphthyl-Substituted Enediynes." Presented at the 22nd California State University Biotechnology Symposium, Santa Clara, CA, January 2010.

Nadezhda V. Korovina, Benjamin F. Gherman and John D. Spence. "Synthesis and Photoreactivity of 1,2-bis(naphthalene-1-ylethynyl)benzene: A Combined Experimental and Computational Investigation." Presented at the 238th National Meeting of the American Chemical Society, Washington D. C., August 2009. Paper CHED 283.

Nadia Korovina, Benjamin F. Gherman and John D. Spence. "Synthesis and photoreactivity of 1,2-bis(naphthalene-1-ylethynyl)benzene: A combined experimental and computational investigation." Presented at the Symposium on Learning and Industry Targeting Computational Chemistry Opportunities (Sylicco.09), University of California Davis, Davis, CA, July 2009.

Michael L. Chang and John D. Spence. "Syntheses and Reactivity of (Naphthalen-2-yl) and (Phenanthren-9-yl)ethynyl Arenediynes." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Nicola A. Clayton and John D. Spence. "Will an Enetetrayne Undergo Bergman Cyclization?." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Christopher D. Cox and John D. Spence. "Synthesis and Thermal Reactivity of Quinoxalenediynes." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Nicholas P. Genovia and John D. Spence. "Radical Initiated and Photochemical Cyclizations of Naphthyl Alkynes." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Nadezhda V. Korovina, Benjamin F. Gherman and John D. Spence. "Synthesis and Photoreactivity of 1,2-bis(naphthalene-1-ylethynyl)benzene: A Combined Experimental and Computational Investigation." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Claire M. McCutcheon and John D. Spence. "Bergman Cyclization of Phenanthroquinoxalenediyne." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Trang T. Nguyen and John D. Spence. "Synthesis of 1,2-bis(4-methoxynaphth-1-yl)ethynyl Benzene for Photo-Bergman Cyclization." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Joseph R. Renner and John D. Spence. "Highly Conjugated Arenediynes: Synthesis, Structure, and Reactivity of 1,2-bis(2-(Anthracen-9-yl)ethynyl)benzene." Presented at the 21st Annual Northern California ACS Undergraduate Research Symposium, St. Mary's College, Moraga, CA, May 2009.

Michael L. Chang and John D. Spence. "Syntheses and Reactivity of (Naphthalen-2-yl) and (Phenanthren-9-yl)ethynyl Arenediynes." Presented at the 237th National Meeting of the American Chemical Society, Salt Lake City, UT, April 2009. Paper CHED 863.

Joseph R. Renner and John D. Spence. "Highly Conjugated Arenediynes: Synthesis, Structure, and Reactivity of 1,2-bis(2-(Anthracen-9-yl)ethynyl)benzene." Presented at the 237th National Meeting of the American Chemical Society, Salt Lake City, UT, April 2009. Paper CHED 775.

Kristie A. Rivera and John D. Spence. "Synthesis of Phenanthro-Fused Quinoxalenediynes to Examine Enediyne Photoreactivity with Visible Light." Presented at the 235st National Meeting of the American Chemical Society, New Orleans, LA, April 2008. Paper 494.

Heather J. Walker and John D. Spence. "Synthesis and Photo-Bergman Cyclization of Naphthylethynyl Arenediynes." Presented at the 235st National Meeting of the American Chemical Society, New Orleans, LA, April 2008. Paper 363.

Ashlee Barton and John D. Spence. "Synthesis of an Enetriyne and Enetetrayne for Bergman Cyclizations." Presented at the 19th Annual Northern California ACS Undergraduate Research Symposium, Sonoma State University, CA, May 2007.

Kenneth V. Lawson and John D. Spence. "Synthetic Approaches Towards mono-Azacalix[4]arene." Presented at the 19th Annual Northern California ACS Undergraduate Research Symposium, Sonoma State University, CA, May 2007.

Oleysa Mysin and John D. Spence. "Synthesis of Mono-substituted Enediynes for Improved Photo-Bergman Cyclizations." Presented at the 19th Annual Northern California ACS Undergraduate Research Symposium, Sonoma State University, CA, May 2007.

Joseph Ramirez and John D. Spence. "Synthesis and Photoreactivity of Highly Conjugated Cyclic Arenediynes." Presented at the 19th Annual Northern California ACS Undergraduate Research Symposium, Sonoma State University, CA, May 2007.

Kristie Rivera and John D. Spence. "Synthesis and Photoreactivity of Benzannelated Enediynes." Presented at the 19th Annual Northern California ACS Undergraduate Research Symposium, Sonoma State University, CA, May 2007.

Shawn W. Skinner and John D. Spence. "Naphthylethynyl Arenediynes: Monitoring Effects of Naphthyl Group Orientation on Enediyne Cyclization." Presented at the 19th Annual Northern California ACS Undergraduate Research Symposium, Sonoma State University, CA, May 2007.

William Kerlin, Michael Payne, Jack Russell, and John D. Spence. "Piperine Amide Bond Rotation Monitored by Variable Temperature NMR." Presented at the 232nd National Meeting of the American Chemical Society, San Francisco, CA, September 2006. Paper 119.

Andro C. Rios and John D. Spence. "The Power of the Bergman Cyclization: Design and Synthesis of Light Activated Pro-Drugs." Presented at the 20th Annual California State University Research Competition, CSU Channel Islands, May 2006 (awarded first place presentation).

Megan A. Frost and John D. Spence. "Synthesis of Pro-Drugs for DNA Cleavage." Presented at the 18th Annual Northern California ACS Undergraduate Research Symposium, San Jose State University, San Jose, CA, May 2006.

Heather J. Walker and John D. Spence. "Nitration of Methyl Salicylate." Presented at the 18th Annual Northern California ACS Undergraduate Research Symposium, San Jose State University, San Jose, CA, May 2006.

Andro C. Rios and John D. Spence. "Design and Synthesis of Aryl-Fused Quinoxalenediynes." Presented at the 231st National Meeting of the American Chemical Society, Atlanta, GA, March 2006. Paper 373.

Kenneth V. Lawson and John D. Spence. "Synthetic Approaches Towards mono-Azacalix[4]arene." Presented at the 231st National Meeting of the American Chemical Society, Atlanta, GA, March 2006. Paper 551.

Miranda L. Lackie and John. D. Spence. "Synthesis of 1,2-Bis(phenylbutadiynyl)benzene." Presented at the 231st National Meeting of the American Chemical Society, Atlanta, GA, March 2006. Paper 519.

Andro C. Rios and John D. Spence. "The Power of the Bergman Cyclization." Presented at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Atlanta, GA, November 2005.

Andro C. Rios and John D. Spence. "Synthesis and Thermal Bergman Cyclization of Aromatic Based Enediyne Pro-Drugs." Presented at the 17th Annual Northern California ACS Undergraduate Research Symposium, Mills College, Oakland, CA. April 2005.

Amanda E. Hargrove and John D. Spence. "Synthesis and Bergman cyclization of a *meso*-tethered porphyrenediyne." Presented at the 227th National Meeting of the American Chemical Society, Anaheim, CA, March 2004.

Hannah L. Heilveil and John D. Spence. "Synthesis of a cofacial porphyrenediyne and studies towards facilitated Bergman cyclization." Presented at the 227th National Meeting of the American Chemical Society, Anaheim, CA, March 2004.

Domingo M. LLagostera and John D. Spence. "Synthesis and Bergman cyclization of *beta*-extended porphyrenediynes." Presented at the 227th National Meeting of the American Chemical Society, Anaheim, CA, March 2004.

Hannah Heilveil, Mandy Hargrove and John D. Spence. "Synthetic Approaches Towards Acyclic Enediyne Diporphyrins." Presented at the 3rd Rice Undergraduate Research Symposium, Houston, Texas, January 2003.

Mandy Hargrove, Hannah Heilveil and John D. Spence. "Synthetic Approaches Towards Acyclic Enediyne Diporphyrins." Presented at the 58th Southwest Regional Meeting of the American Chemical Society, Austin, TX, November 2002, poster 36.

Patrick O'Toole and John D. Spence. "Synthesis of Conjugated Porphyrin-Enediyne Hybrids." Presented at the 58th Southwest Regional Meeting of the American Chemical Society, Austin, TX, November 2002, poster 38.

Domingo LLagostera and John D. Spence. "Synthesis and Reduction of 2-Nitropyrroles." Presented at the 58th Southwest Regional Meeting of the American Chemical Society, Austin, TX, November 2002, poster 39.

David Thomas and John D. Spence. "Synthesis of Acyclic Enediyne Diporphyrin Models." Presented at the 223rd National Meeting of the American Chemical Society, Orlando, FL, April 2002, poster 816.

Eric Cline and John D. Spence. "Synthesis of Conjugated Porphyrin-Enediyne Hybrids." Presented at the 223rd National Meeting of the American Chemical Society, Orlando, FL, April 2002, poster 821.

David Thomas, Colin Oliver and John D. Spence. "Utilizing Porphyrins to Control Bergman Cyclization of Acyclic Enediynes." Presented at the 57th Southwest Regional Meeting of the American Chemical Society, San Antonio, TX, October 2001, poster 286.

Ashley Raymond, Brandon Chance and John D. Spence. "Synthesis of Azacalixarenes." Presented at the 57th Southwest Regional Meeting of the American Chemical Society, San Antonio, TX, October 2001, poster 289.

David Thomas, Colin Oliver and John D. Spence. "Utilizing Porphyrins to Control Bergman Cyclization of Acyclic Enediynes." Presented at the 14th Annual Baylor Undergraduate Research Symposium, Waco, Texas, October 2001. Also Presented at the 2nd Rice Undergraduate Research Symposium, Houston, Texas, November 2001.

Eric Cline and John D. Spence. "Porphyrenediyne Hybrids: Conjugation of Enediynes to Porphyrin Macrocycles for Improved Photochemical Activation." Presented at the 14th Annual Baylor Undergraduate Research Symposium, Waco, Texas, October 2001. Also Presented at the 2nd Rice Undergraduate Research Symposium, Houston, Texas, November 2001.

Ashley Raymond and John D. Spence. "Synthesis of Azacalixarenes." Presented at the 14th Annual Baylor Undergraduate Research Symposium, Waco, Texas, October 2001. Also Presented at the 2nd Rice Undergraduate Research Symposium, Houston, Texas, November 2001.

M. L. Thompson, J. D. Spence, and T. D. Lash. "Synthesis of Porphyrins with Fused Fluoranthene and Chrysene Subunits." Presented at the Undergraduate Research Poster Session at the 215th National Meeting of the American Chemical Society, Boston, MA, August 1998. Paper 256.

J. L. Romanic, J. D. Spence, and T. D. Lash. "Synthesis of a Dicarbaporphyrin." Presented at the Undergraduate Research Poster Session at the 215th National Meeting of the American Chemical Society, Boston, MA, August 1998. Paper 257.

J. L. Yoder, J. D. Spence, and T. D. Lash. "Improved 2+2 Synthesis of Cycloalkano-porphyrins." Presented at the Undergraduate Research Poster Session at the 215th National Meeting of the American Chemical Society, Boston, MA, August 1998. Paper 255.

J. M. Manley, J. D. Spence, and T. D. Lash. "Synthesis of a Tetranaphthoporphyrin." Presented at the Undergraduate Research Poster Session at the 215th National Meeting of the American Chemical Society, Boston, MA, August 1998. Paper 258.

P.-C. Phan, J. D. Spence, and T. D. Lash. "Synthesis of 21,21-Dithiaporphyrins." Presented at the Undergraduate Research Poster Session at the 215th National Meeting of the American Chemical Society, Boston, MA, August 1998. Paper 259.

Summary of Undergraduate Research Mentoring

65 total undergraduates mentored in research since 1997 (5 ISU, 22 Trinity, 38 CSUS)
28 undergraduate co-authors on peer-reviewed publications
36 student presentations at Regional and National ACS Meetings
51 student presentations at off-campus Undergraduate Research Symposia
Research awards received by mentored undergraduates:

NSF Graduate Research Fellowship Recipient, NSF Graduate Research Fellowship Honorable Mention (2), Goldwater Scholarship, Merck UNCF Scholarship, NCAA Postgraduate Scholarship, ACS Organic Division Travel Award, ACS Scholar, McNair Scholar, Dean's Award (2) CSUS

Post Graduation Positions:

Graduate Programs:	UT Austin, Texas A&M, UC Berkeley, Johns Hopkins, Princeton, UCSF, University of Colorado, UC San Diego, UCLA, USC, University of Nevada Reno, Oregon State University
Medical Schools:	Indiana University, University of Colorado, University of Georgia, Western University of Health Sciences, UC Davis, University of Florida
Pharmacy Schools:	University of the Pacific, UCSF
Dental Schools:	UCSF
Industry:	Merck, Pfizer, MD Anderson, Chevron-Oronite, AMPAC Fine Chemicals, Amgen, Genentech, ERIN Engineering